CRSM054N04L2DQ

SkyMOS2 N-MOSFET 40V, 4.3mΩ, 50A

Features

- Uses CRM(CQ) advanced SkyMOS2 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Q_gx$R_{DS(on)}$ product(FOM)
- AEC-Q101 Qualified
- MSL1 up to 260°C peak reflow

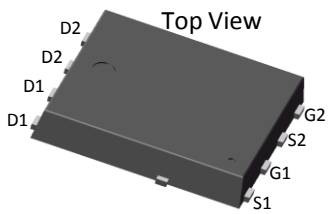
Product Summary

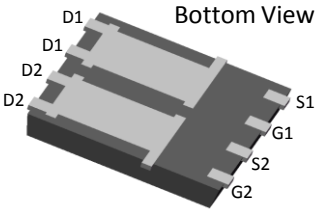
V_{DS}	40V
$R_{DS(on).typ}$	4.3mΩ
I_D	50A

Applications

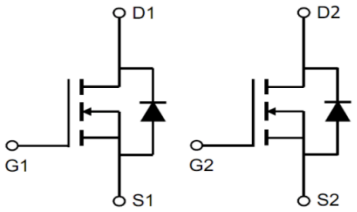
- Motor control and drive
- Battery management System

100% DVDS Tested
100% Avalanche Tested





CRSM054N04L2DQ



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM054N04L2DQ	054N04L2DQ	DFN5*6	Tape&reel	N/A	N/A	4000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	40	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 80 50 59	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	200	A
Avalanche energy, single pulse (I_D = 36A, Rg=25Ω)[1]	E_{AS}	195	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	45	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	Tsold	260	°C

※. Notes:
1.EAS is tested at starting Tj = 25℃, L = 0.3mH, IAS =36A, Vds = 40V.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	3.3	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	
Thermal resistance, junction – plastic case	R_{thj-pc}	20	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	40	-	-	V	V_{GS}=0V, I_D=250uA
		40	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{GS(th)}$	1.5	-	2.4	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	1 100	μA	V_{DS}=40V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	4.3	5.4	mΩ	VGS=10V, ID=40A
		-	6.2	8.0		VGS=4.5V, ID=32A
Transconductance	g_{fs}		115	230	S	V_{DS}=5V, I_D=40A
Dynamic Characteristic						
Input Capacitance	C_{iss}	840	1680	3360	pF	VGS=0V, VDS=20V, f=1MHz
Output Capacitance	C_{oss}	320	640	1280		
Reverse Transfer Capacitance	C_{rss}	-	22	110		
Gate Total Charge	Q_G	14	28	56	nC	VGS=10V, VDS=20V, ID=40A, f=1MHz
Gate-Source charge	Q_{gs}	-	9	18		
Gate-Drain charge	Q_{gd}	-	4.2	21		
Turn-on delay time	$t_{d(on)}$	-	8	16	ns	Vds=20V Id=40A Rg=3Ω Vgs=10V
Rise time	t_r	-	23	46		
Turn-off delay time	$t_{d(off)}$	-	22	44		
Fall time	t_f	-	8	22.8		
Gate resistance	R_G	-	1.3	2.5	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.9	1.4	V	V_{GS}=0V, I_{SD}=40A
Body Diode Reverse Recovery Time	t_{rr}	15	30	60	ns	I_F=40A,dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	10	19	38	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

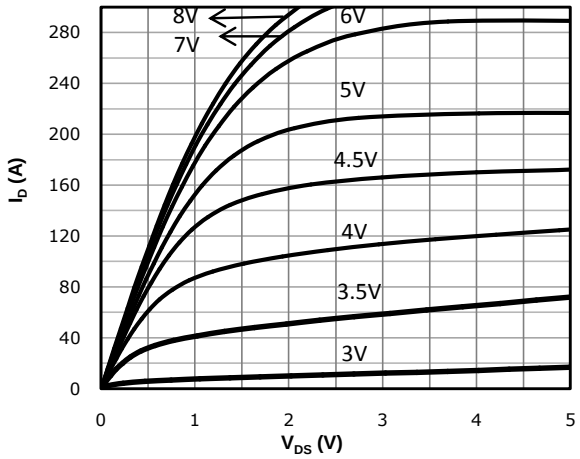


Fig 2: Transfer Characteristics

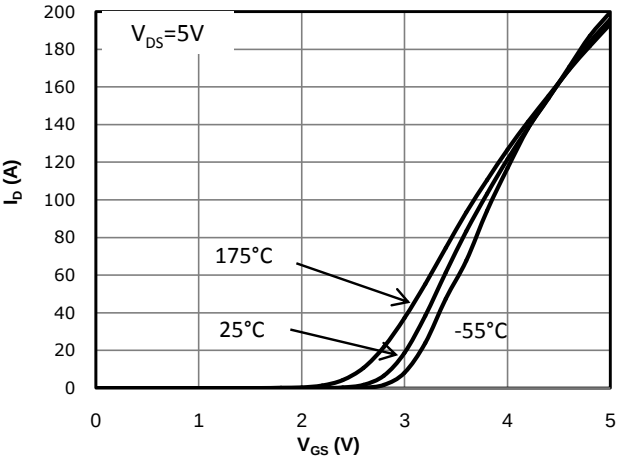


Fig 3: Rds(on) vs Drain Current and Gate Voltage

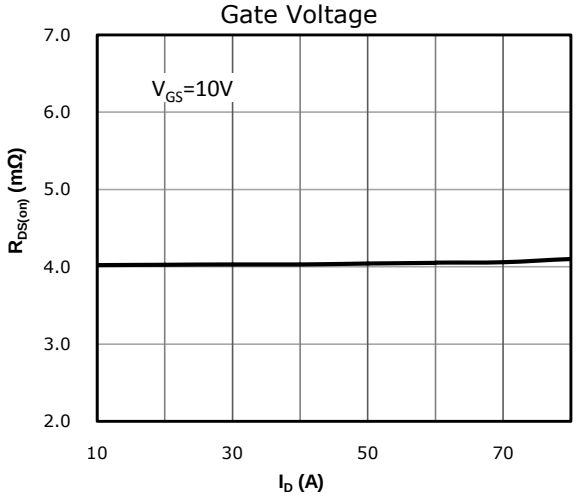


Fig 4: Rds(on) vs Gate Voltage

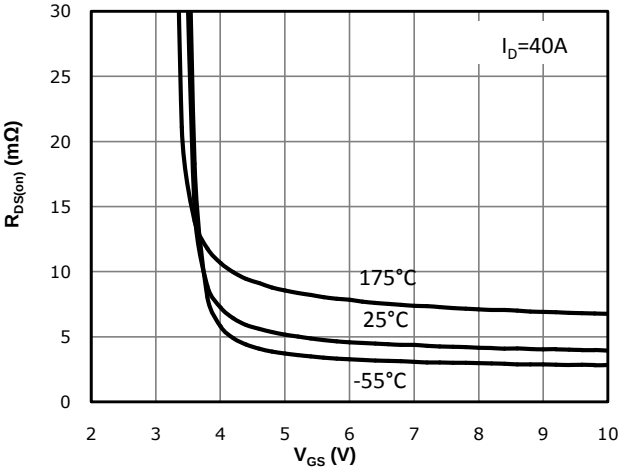


Fig 5: Rds(on) vs. Temperature

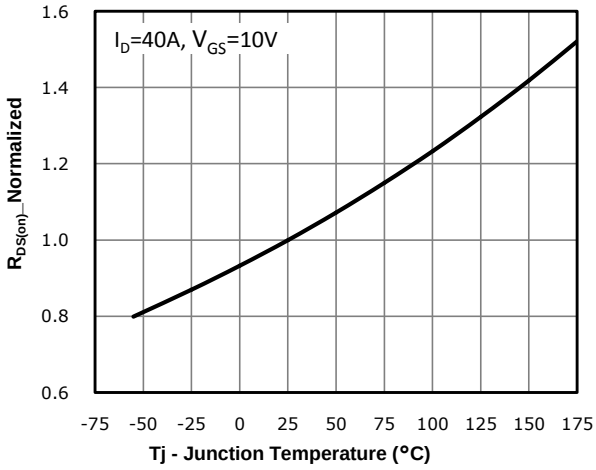


Fig 6: Vgs(th) vs. Temperature

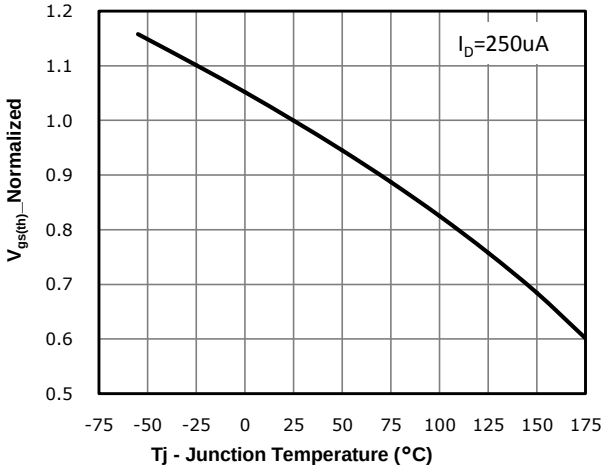


Fig 7: BVdss vs. Temperature

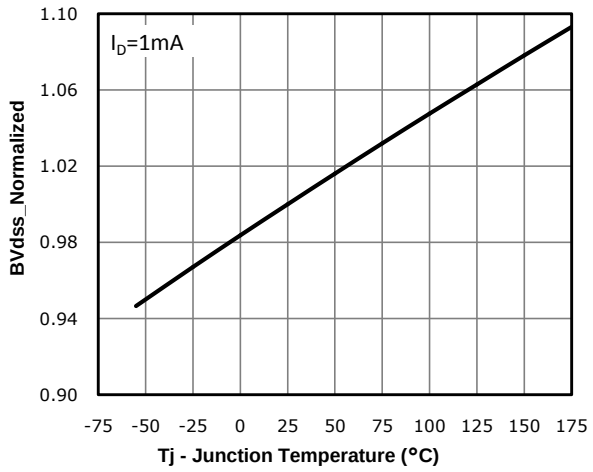


Fig 8: Capacitance Characteristics

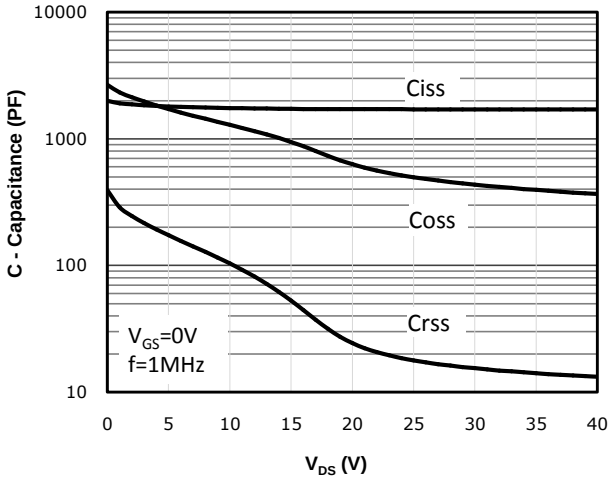


Fig 9: Gate Charge Characteristics

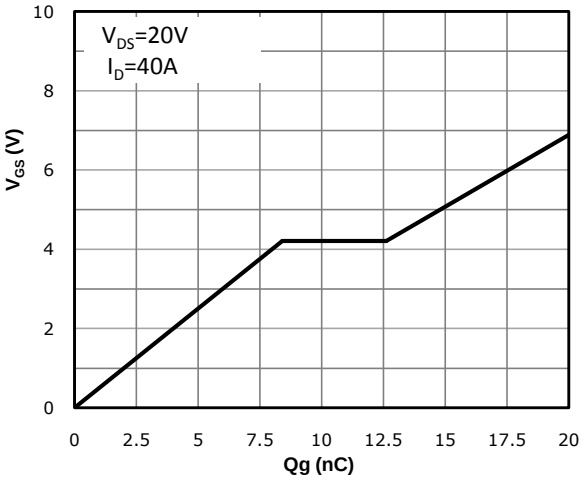


Fig 10: Body-diode Forward Characteristics

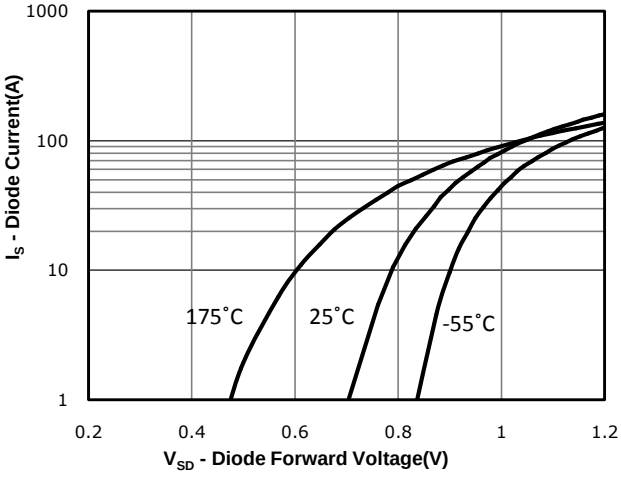


Fig 11: Power Dissipation

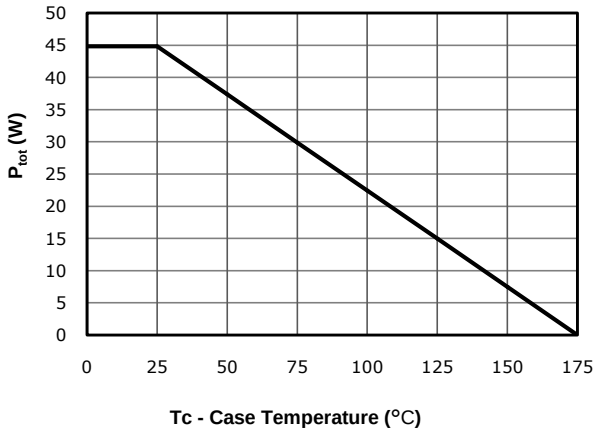


Fig 12: Drain Current Derating

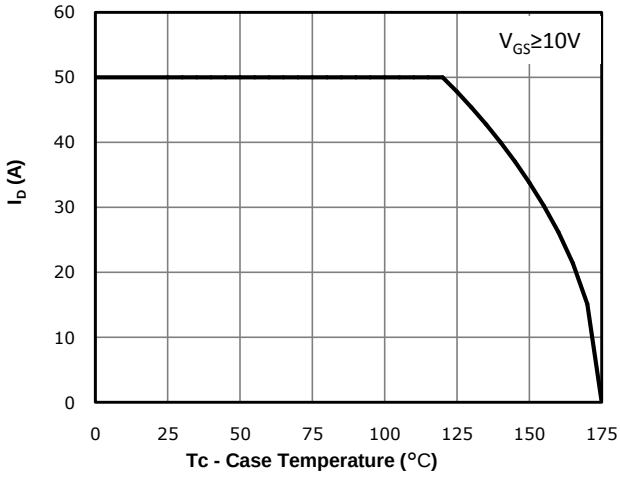


Fig 13: Safe Operating Area

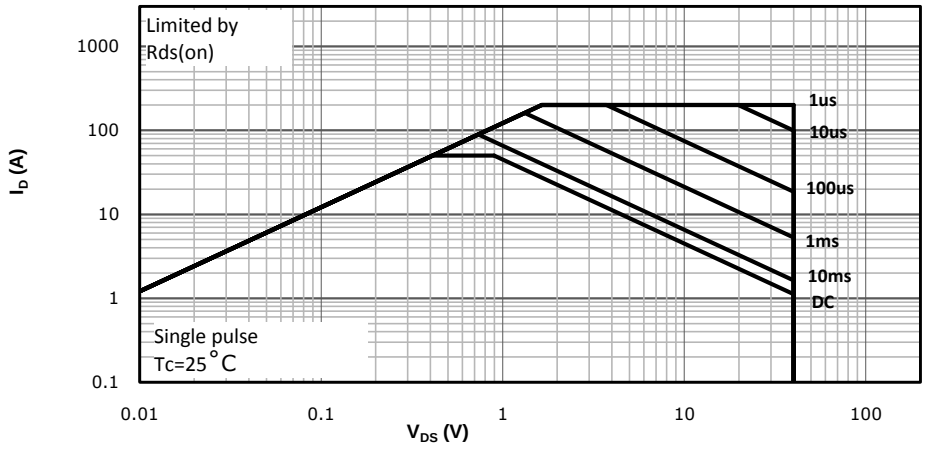
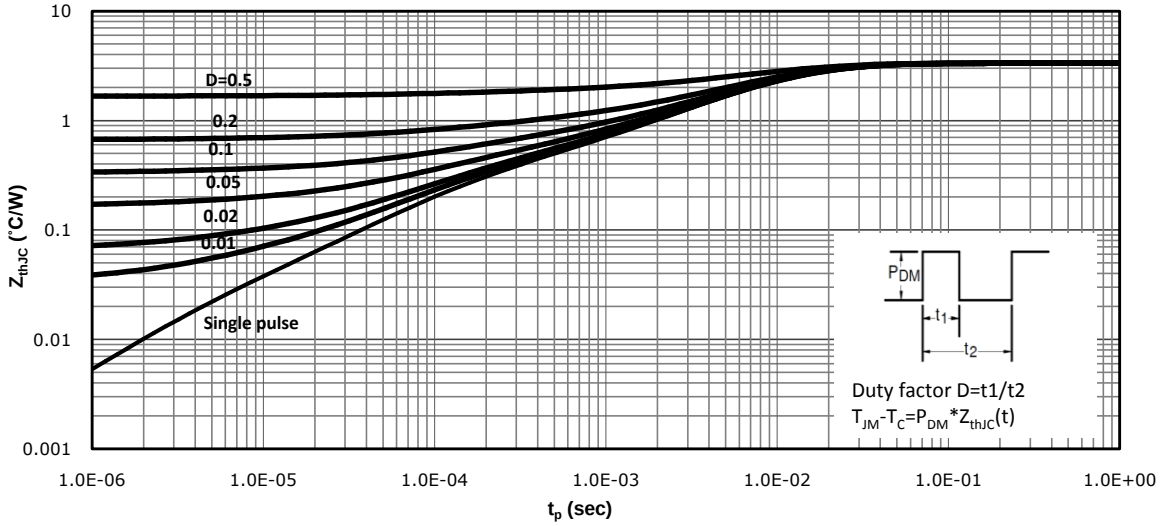
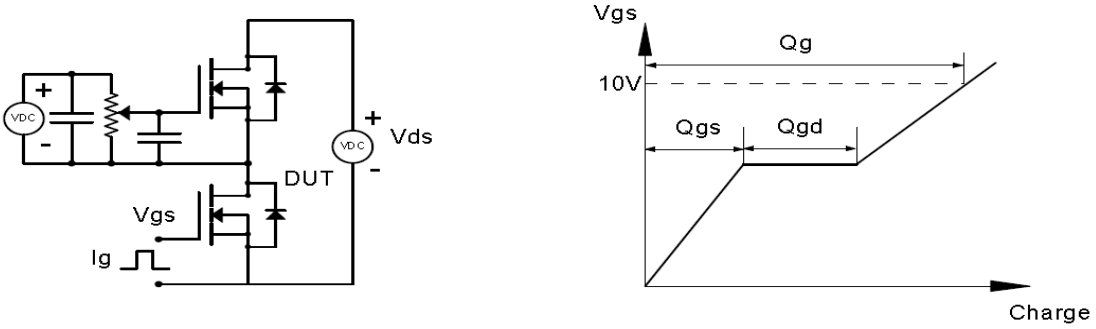


Fig 14: Max. Transient Thermal Impedance

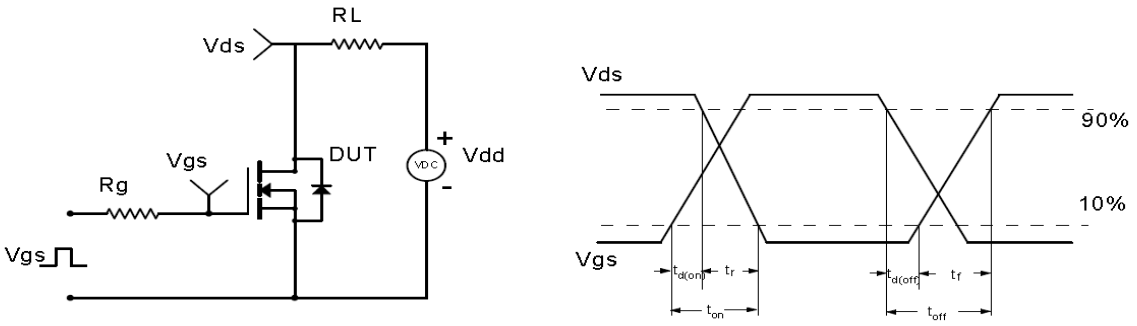


Test Circuit & Waveform

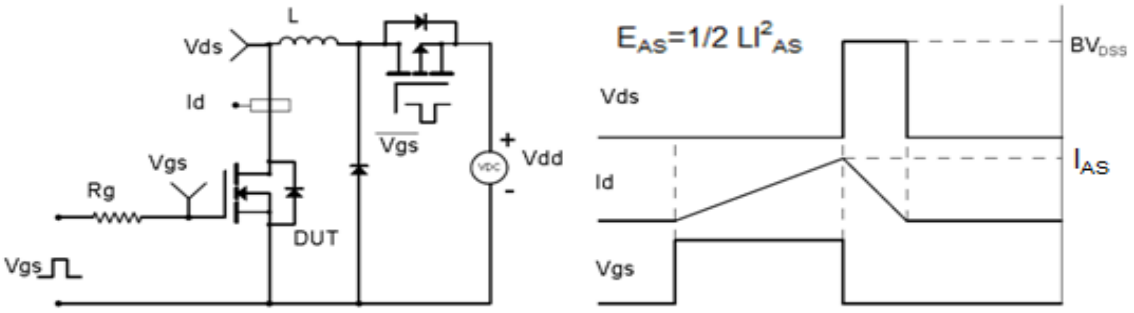
Gate Charge Test Circuit & Waveform



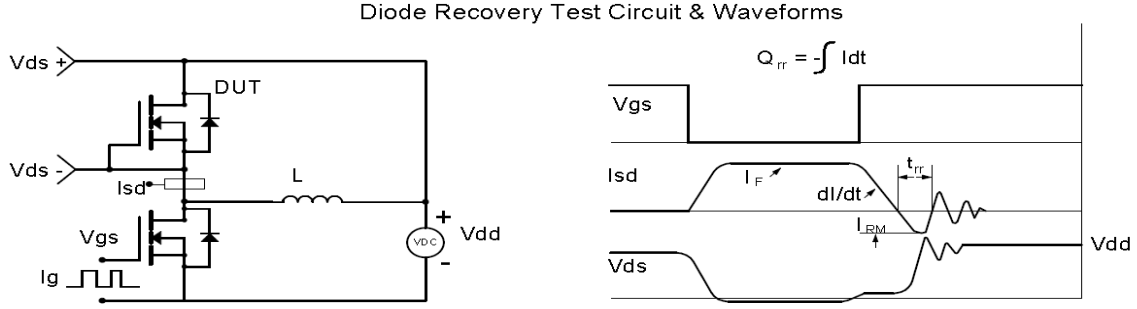
Resistive Switching Test Circuit & Waveforms



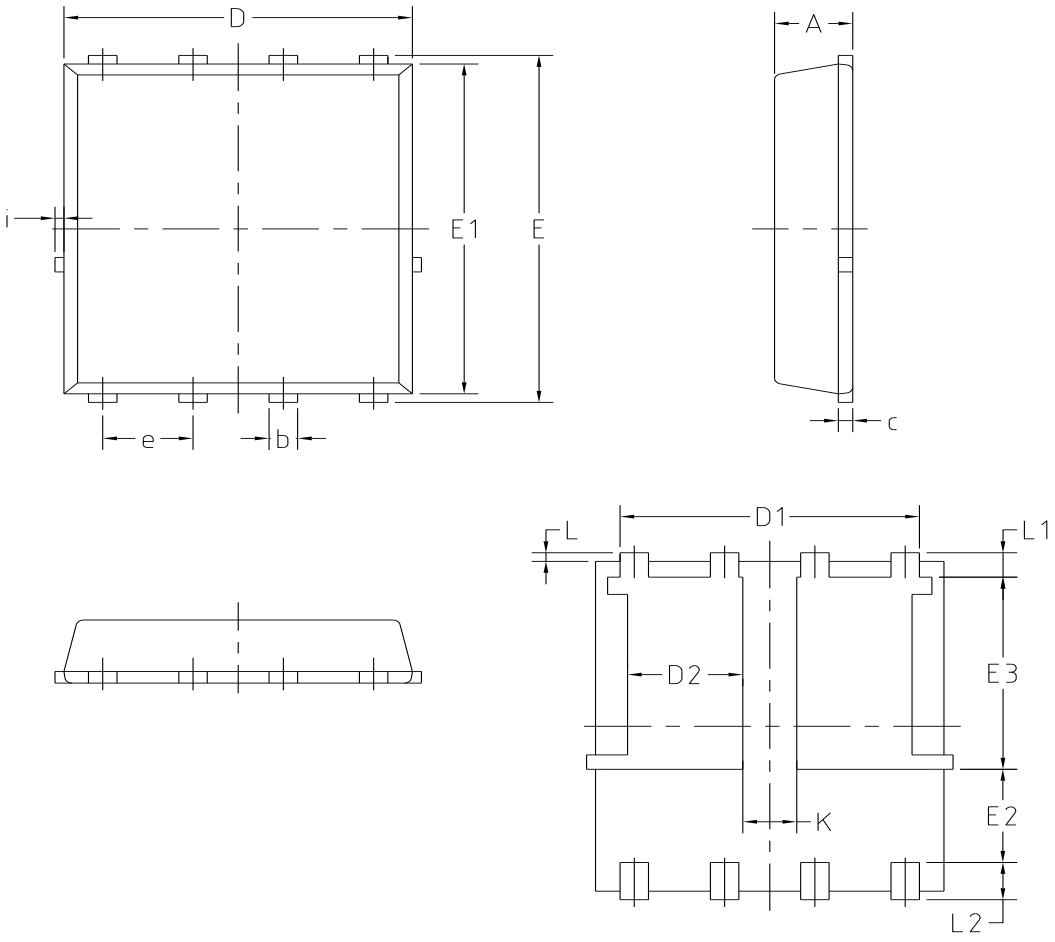
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

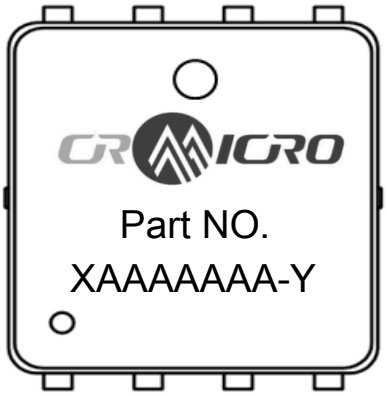


Package Outline: PDFN5x6 Dual Pad Type 9



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.20	0.039	0.047
b	0.30	0.50	0.012	0.020
c	0.203 BSC		0.008 BSC	
D	4.80	5.00	0.189	0.197
D1	4.06	4.36	0.160	0.172
D2	1.47	1.77	0.058	0.070
E	5.90	6.20	0.232	0.244
E1	5.65	5.85	0.222	0.230
E2	1.45	-	0.057	-
E3	3.20	3.50	0.126	0.138
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.002	0.010
L1	0.325	0.525	0.013	0.021
L2	0.50	0.80	0.020	0.031
i	-	0.20	-	0.008
K	0.61	0.91	0.024	0.036

Marking



NOTE:
XAAAAAAA-Y
X —Assembly location code
AAAAAAA —Assembly lot NO. last 7 digits
Y —Bin code

Revision History

Revision	Date	Major changes
1.0	2023/10/17	Release of Preliminary version.

Disclaimer

CRM reserves the right to change any product or information in this Specification at any time without prior notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics .The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

The product is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation/aerospace and life-support devices or systems.

Any and all semicondutor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.